

SECTION 14 21 00

ELECTRIC TRACTION ELEVATORS

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SECTION 14 21 00
ELECTRIC TRACTION ELEVATORS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. FOUR (4) traction elevator(s) as follows:
 - 1. TWO (2) Geared Passenger Elevator(s). Car(s) 1 & 2
 - 2. TWO (2) Geared Passenger/Service Elevator(s). Car(s) 3 & 4
- B. All engineering, equipment, labor, and permits required to satisfactorily complete elevator installation required by Contract Documents.
- C. Additional equipment or finishes furnished under other sections, installed under this section:
 - 1. CCTV system
 - 2. Card reader security system

1.2 RELATED WORK PROVIDED UNDER OTHER SECTIONS

- A. Hoistway and Pit:
 - 1. Clear, plumb, substantially flush hoistway with variations not to exceed 1" at any point.
 - 2. Bevel cants not less than 75° from the horizontal on any rear or side wall ledges and beams that project or recess 4" or more into the hoistway. Not required on hoistway divider beams.
 - 3. Divider beams between adjacent elevators at each floor, pit, and overhead. Supports at each floor for car and counterweight guide rail fastening. Intermediate car guide rail support when floor heights exceed 14'-0" or as designated on contract drawings. Intermediate counterweight guide rail supports where floor heights exceed 16'-0". Building supports not to deflect in excess of 1/8" under normal conditions.
 - 4. Installation of guide rail bracket supports in concrete. Inserts or embeds, if used, will be furnished under this Section.
 - 5. Wall blockouts and fire rated closure for control and signal fixture boxes which penetrate walls.
 - 6. Cutting and patching walls and floors.
 - 7. Structural slab, concrete wall pockets and/or structural steel beams for support of hoist machine, rope sheaves, and dead-end hitch beams. Support deflection shall not exceed 1/1666 of span under static load. Concrete or structural steel machine hold down means

for hoist machine mounted offset from hoistway or below bottom landing.

8. Erect front hoistway wall after elevator entrances are installed.
9. Grout floor up to hoistway sills and around hoistway entrances.
10. Lockable, self-closing, fire-rated pit door.
11. Pit access ladder for each elevator.
12. Structural support at pit floor for buffer impact loads, guide rail loads.
13. Waterproof pit. Indirect waste drain or sump with flush grate and pump.
14. Protect open hoistways and entrances during construction per OSHA Regulations.
15. Protect car enclosure, hoistway entrance assemblies, and special metal finishes from damage.
16. Hoistway venting.
17. Hoistway lighting and machine room switch.
18. Seal fireproofing to prevent flaking.
19. Access ladders and platform to governor(s).
20. Partition between machine room and hoistway where hoist machine is mounted offset from hoistway.
21. Paint walls and ceiling.

B. Machine Room and Machinery Spaces:

1. Enclosure with access. Provide ships ladder or stair with guard railing. Include similar access to overhead machinery space.
2. Self-closing and locking access door.
3. Ventilation and heating. Maintain minimum temperature of 55° F, maximum 90° F. Maintain maximum 80% relative humidity, non-condensing.
4. Paint walls and ceiling.
5. Class "ABC" fire extinguisher in each elevator machine room.
6. Seal fireproofing to prevent flaking.
7. Fire sprinklers where required.
8. Overhead floor grating for access to overhead machinery space.

C. Electrical Service, Conductors, and Devices:

1. Lighting and GFCI convenience outlets in pit, machine room, and overhead machinery spaces. Provide one additional non-GFCI convenience outlet in pit for sump pump.

2. Three-phase mainline copper power feeder with true earthen grounding to terminals of each elevator controller in the machine room with protected, lockable "open" disconnecting means. Auxiliary disconnects in multi-level machine room.
 3. Single-phase copper power feeder to each elevator controller for car lighting and exhaust blower with individual protected, lockable "open" disconnecting means located in machine room.
 4. Emergency telephone line to each individual elevator control panel in elevator machine room.
 5. Fire alarm initiating devices in each elevator lobby for each group of elevators or single elevator and each machine room to initiate firefighters' return feature. Device at top of hoistway if sprinklered. Provide alarm initiating signal wiring from hoistway or machine room connection point to elevator controller terminals. Device in machine room and at top of hoistway to provide signal for general alarm and discrete signal for Phase II firefighters' operation.
 6. Temporary power and illumination to install, test, and adjust elevator equipment.
 7. Means to automatically disconnect power to affected elevator drive unit and controller prior to activation of machine room fire sprinkler system and/or hoistway fire sprinkler system. Manual shut-off means shall be located outside bounds of machine room.
 8. When sprinklers are provided in the hoistway all electrical equipment located less than 4'-0" above the pit floor shall be identified for use in wet locations.
 9. Single-phase power feeders to machine room elevator for hoistway lighting and toggle switch.
 10. Single-phase power feeders to machine room elevator monitoring panel/display unit with single-phase, protected, lockable "open" disconnecting means.
 11. Single-phase power feeders to controller(s) for CCTV with lockable "open" disconnecting means.
- D. Emergency Power Provision:
1. Emergency power of normal voltage characteristics via normal electrical feeders to run one elevator at a time in each elevator group at full-contract car speed and capacity.

2. Conductor from auxiliary form "C" dry contacts, located in the Emergency power transfer switch to a designated elevator control panel in each elevator group. Provide a time delay of 30 - 45 seconds for pre-transfer signal in either direction.
3. Emergency single-phase power to group controller, and each elevator controller for car lighting, exhaust blower, emergency signaling device, hoist machine cooling fan.
4. Means for absorbing regenerated power during an overhauling load condition per NEC 620.91.
5. Emergency power to machine room, pit, and overhead machinery space lighting.
6. Emergency power to machine room ventilation or air conditioning.
7. Emergency power to emergency communications device(s).

E. Cab Finishes:

1. Section 09 06 00, Schedule for Finishes.

1.3 DEFINITIONS

- A. Terms used are defined in the latest edition of the Safety Code for Elevators and Escalators, ASME A17.1.
- B. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.
- C. Provisions of this specification are applicable to all elevators unless identified otherwise.

1.4 QUALITY ASSURANCE

- A. Compliance with Regulatory Agencies: Comply with most stringent applicable provisions of following codes, laws, and/or authorities, including revisions and changes in effect:
 1. Safety Code for Elevators and Escalators, ASME A17.1
 2. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2
 3. Elevator and Escalator Electrical Equipment, ASME A17.5
 4. National Electrical Code, NFPA 70
 5. Americans with Disabilities Act, ADA
 6. Local Fire Authority
 7. Requirements of UBC, BOCA, SBC, IBC, OSHPD, DSA, and all other codes, ordinances and laws applicable within the governing jurisdiction
 8. Life Safety Code, NFPA 101

9. Uniform Federal Accessibility Standard, UFAS

10. VA Vertical Transportation Guidelines

B. Warranty:

1. Material and workmanship of installation shall comply in every respect with Contract Documents. Correct defective material or workmanship which develops within one year from date of final acceptance of all work to satisfaction of Resident Engineer at no additional cost, unless due to ordinary wear and tear or improper use or care by Government. Perform maintenance in accordance with terms and conditions indicated in the Preventive Maintenance Agreement.
2. Defective is defined to include, but not limited to; operation or control system failures, car performance below required minimum, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unsatisfactory conditions.
3. Make modifications, requirements, adjustments, and improvements to meet performance requirements in Parts 2 and 3.

1.5 DOCUMENT VERIFICATION

- A. In order to discover and resolve conflicts or lack of definition which might create problems, Contractor must review Contract Documents for compatibility with its product prior to submittal of quotation. Government will not pay for change to structural, mechanical, electrical, or other systems required to accommodate Contractor's equipment.

1.6 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, Shop Drawings, Product Data and Samples.
- B. Within 45 calendar days after award of contract and before beginning equipment fabrication submit shop drawings and required materials for review as outlined in Division I. Allow 10 calendar days for response to initial submittal.
1. Scaled or Fully Dimensioned Layout: Plan of pit, hoistway, and machine room indicating equipment arrangement, elevation section of hoistway, details of car enclosures, hoistway entrances, and car/hall signal fixtures.

2. Design Information: Indicate equipment lists, reactions, and design information on layouts.
3. Power Confirmation Information: Include motor horsepower, code letter, starting current, full-load running current, and demand factor.
4. Fixtures: Cuts, samples, or shop drawings.
5. Finish Material: Submit 3" x 12" samples of actual finished material for Resident Engineer review of color, pattern, and texture. Compliance with other requirements is the exclusive responsibility of the Contractor. Include, if requested, signal fixtures, lights, graphics, Braille plates, and details of mounting provisions.

C. Acknowledge and/or respond to review comments within 10 calendar days of return. Promptly incorporate required changes due to inaccurate data or incomplete definition so that delivery and installation schedules are not affected. Contractor's revision response time is not justification for equipment delivery or installation delay.

1.7 PERMIT, TEST AND INSPECTION

- A. Obtain and pay for permit, license, and inspection fee necessary to complete installation.
- B. Perform test required by Governing Authority in accordance with procedure described in ASME A17.2 Guide for Inspection of Elevators, Escalators, and Moving Walks in the presence of Authorized Representative.
- C. Supply personnel and equipment for test and final review by Consultant as required in Part 3.

1.8 MAINTENANCE

- A. Interim:
 1. When one or more elevators are near completion and ready for service the General Contractor may accept elevators for interim use and place in service prior to substantial completion of project.
 2. During this period General Contractor may pay a mutually agreed upon monthly amount per elevator for preventive maintenance. Indicate amount per unit per month with quotation.
 3. Temporary acceptance form must be acceptable to General Contractor and signed prior to use.

4. General Contractor must provide or pay for temporary hoistway and car enclosures; protect installed equipment and finishes; pay for and return elevators to elevator sub-contractor for all cleaning, repairs, and replacement of materials necessary to restore elevator to "as-new" condition prior to final acceptance.

B. Warranty Maintenance:

1. Provide preventive maintenance and 24-hour emergency callback service for one year commencing on date of final acceptance by Resident Engineer. Systematically examine, adjust, clean, and lubricate all equipment. Repair or replace defective parts using parts produced by the Contractor of installed equipment. Maintain elevator machine room, hoistway, and pit in clean condition.
2. Use competent personnel, acceptable to the Resident Engineer, supervised and employed by Contractor.
3. The warranty maintenance period specified in Item 1 above shall be extended one (1) month for each three (3) month period in which equipment related failures average more than .25 per unit per month.
4. Resident Engineer retains the option to delete cost of warranty maintenance from new equipment contract and remit twelve (12) equal installments directly to Contractor during period in which maintenance is being performed.

C. Preventive Maintenance:

1. Quote monthly cost for five year Preventive Maintenance Agreement commencing upon completion of warranty maintenance.
2. Use competent personnel, acceptable to the Resident Engineer, employed and supervised by Contractor.

PART 2 PRODUCTS

2.1 SUMMARY

- A. TWO (2) Passenger Elevator(s) and TWO (2) Service Elevator(s)

Number:	Car(s) PASSENGER 1-2 SERVICE 3-4
Capacity:	#1-#2 3000 # #3 5000 # #4 6500#
Class Loading:	Passenger Class A Service Class A

Contract Speed:	350 F.P.M
Roping:	1:1
Machine:	Geared
Machine Location:	1-2 Below Pit 3-4 Overhead Offset At TOP FLOOR ROOF
Operational Control:	Duplex Selective Collective Microprocessor-Based System
Motor Control:	AC Variable Voltage Variable Frequency Microprocessor-Based with Digital Closed-Loop Feedback
Power Characteristics:	480 Volts, 3 Phase, 60 Hertz
Stops:	Car(s) 1-2 3 Front 0 Rear Car(s) 3 5 Front 0 Rear Car(s) 4 5 Front 1 Rear
Openings:	Car(s) 1-2 3 Front 0 Rear Car(s) 3 5 Front 0 Rear Car(s) 4 5 Front 1 Rear
Floors Served:	Car(s) 1-2 G, 1-2 Front 0 Rear Car(s) 3 B, G, 1-2, ROOF Front 0 Rear Car(s) 4 B, G, 1-2, ROOF Front BRIDGE Rear
Travel:	Car(s) 1-2 35'-0" ± Car(s) 3-4 67'-0" ±
Platform Size:	Car(s) 1-2 7'-0" Wide X 5'-6" Deep Car(s) 3 6'-0" Wide X 10'-1½" Deep Car(s) 4 7'-0" Wide X 10'-6" Deep
Minimum Clear Inside Car:	Car(s) 1-2 7'-0" Wide X 5'-6" Deep Car(s) 3 5'-8" Wide X 8'-7½" Deep Car(s) 4 6'-8" Wide X 9'-0" Deep
Entrance Size:	Car(s) 1-2 3'-6" Wide X 7'-0" Deep Car(s) 3 4'-6" Wide X 7'-0" Deep Car(s) 4 5'-0" Wide X 7'-0" Deep

Entrance Type:	Car(s) 1-2 Single, Center Opening Car(s) 3 Two Speed Side Opening Car(s) 4 Single Speed Center Opening
Door Operation:	High Speed, Heavy-Duty, Door Operator, Minimum Opening Speed 2- 1/2 F.P.S.
Door Protection:	Infrared, Full Screen Device with Differential Timing, Nudging and Interrupted Beam Time
Safety:	Flexible Guide Clamp-Type B, Car
Guide Rails:	Planed Steel Tees
Buffers:	Oil
Car Enclosure:	As Detailed on Architectural Drawings Steel Shell as Specified Plus, Refer to Section 09 06 00, Schedule For Finishes 8'-0" Clear Height Under Canopy, Car(s) ALL Battery Powered Emergency Car Lighting. Provide Separate Constant Pressure Test Button in Car Service Compartment. Illuminate Portion Of Normal Car Lighting
Signal Fixtures:	LED Illumination Contractor's Vandal Resistant Assembly
Hall and Car Pushbutton Stations:	Single Hall Pushbutton Riser Car(s) 1-2 Single Car Operating Panel(s) Car(s) 3-4 Dual Car Operating Panel(s) FRONT AND REAR Vandal Resistant Car and Hall Pushbuttons
Car Position Indicators:	Single Digital with Car Direction Arrows MOUNTED IN EACH CAR OPERATING PANEL

Hall Lanterns:	At All Floors with Volume Adjustable Electronic Chime or Tone. Sound Twice for Down Direction
Hall Car Position Indicator:	Car(s) 1-2 Digital Type with Car Direction Arrows at G Floor. Car(s) 3-4 Digital Type with Car Direction Arrows at G.
Communication System:	Self-Dialing, Vandal Resistant, "HELP" button, Two-Way Communication System with Recall, Tracking and Voiceless Communication
Additional Features, Car(s) 1-2-3-4:	Car and Counterweight Roller Guides Car Top Inspection Station Firefighters' Service, Phase I and II, including Alternate Floor Return Emergency Power Transfer (Automatic to Main Floor) with Manual Override Accessibility and Emergency Medical Services Signage Stationary Car Return Panel(s) Arranged for Surface Applied Car Operating Panel(s) Hoistway Access Switches Top and Bottom Floors Hoistway Door Unlocking Device All Floors Platform Isolation Load-Weighing Device Independent Service Feature Priority Service, CODE BLUE, Car(s) 3-4 Card Reader Provisions, All Cars WIRING ONLY

CCTV Provisions, All Cars
WIRING ONLY

Machine, Power Conversion Unit,
and Controller Sound Isolation

Tamper Resistant Fasteners for All
Fastenings Exposed to the Public

One Year Warranty Maintenance with
24-Hour Call-Back Service

Sill Support Angles, CAR(S) 3-4

Signage Engraving Filled with
Black Paint or Approved Etching
Process

No Visible Company Name or Logo

Wiring Diagrams, Operating
Instructions, and Parts Ordering
Information

Monitoring System

System Diagnostic Means and
Instructions

Non-Proprietary Control System and
Diagnostics Provisions

2.2 MATERIALS

A. Steel:

1. Sheet Steel (Furniture Steel for Exposed Work): Stretcher-leveled, cold-rolled, commercial quality carbon steel, complying with ASTM A366, matte finish.
2. Sheet Steel (for Unexposed Work): Hot-rolled, commercial quality carbon steel, pickled and oiled, complying with ASTM A568/A568M-03.
3. Structural Steel Shapes and Plates: ASTM A36.

B. Stainless Steel: Type 302 or 304 complying with ASTM A240, with standard tempers and hardness required for fabrication, strength and durability. Apply mechanical finish on fabricated work in the locations shown or specified, Federal Standard and NAAMM nomenclature, with texture and reflectivity required to match Architect's sample. Protect with adhesive paper covering.

1. No. 4 Satin: Directional polish finish. Graining directions as shown or, if not shown, in vertical dimension.

- C. Aluminum: Extrusions per ASTM B221; sheet and plate per ASTM B209.
- D. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050" \pm 0.005" thick, color and texture as follows:
 - 1. Exposed Surfaces: Color and texture, Refer to Section 09 06 00 Schedule For Finishes.
 - 2. Concealed Surfaces: Contractor's standard color and finish. Refer to Section 09 06 00 Schedule For Finishes.
- E. Fire-Retardant Treated Particle Board Panels: Minimum 3/4" thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less, registered with Local Authorities for elevator finish materials.
- F. Natural Finish Wood Veneer: Standard thickness, 1/40" thoroughly dried conforming to ASME/HPMA HP-1983, Premium Grade. Place veneer, tapeless spliced with grain running in direction shown, belt and polish sanded, book-matched. Species and finish designated and approved by Architect. Refer to Section 09 06 00 Schedule For Finishes.
- G. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
- H. Prime Finish: Clean all metal surfaces receiving a baked enamel paint finish of oil, grease, and scale. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.
- I. Baked Enamel Finish: Prime finish per above. Unless specified "prime finish" only, apply and bake three (3) additional coats of enamel in the selected solid color. Refer to Section 09 06 00 Schedule For Finishes.

2.3 CAR PERFORMANCE

- A. Car Speed: \pm 3% of contract speed under any loading condition.
- B. Car Capacity: Safely lower, stop and hold 125% of rated load.
- C. Car Stopping Zone: \pm 1/4" under any loading condition.
- D. Door Opening Time: Seconds from start of opening to fully open:
 - 1. Car(s) 1-2: 1.6-2.1 seconds.
 - 2. Car(s) 3: 2.7-3.2 seconds.
 - 3. Car(s) 4: 2.7-3.2 seconds

E. Door Closing Time: Seconds from start of closing to fully closed:

1. Car(s) 1-2: 2.4-2.9 seconds.
2. Car(s) 3: 5.0-5.5 seconds.
3. Car(s) 4: 5.6-6.2 seconds.

F. Car Floor-to-Floor Performance Time: Seconds from start of doors closing until doors are 3/4 open (1/2 open for side opening doors) and car level and stopped at next successive floor under any loading condition or travel direction (12'-0" typical floor height):

1. Car(s) 1-2: 9.0-9.5 seconds.
2. Car(s) 3: 13.0-13.5 seconds.
3. Car(s) 4: 13.5-14.0 seconds

G. Car Ride Quality:

1. Horizontal and vertical acceleration within car during all riding and door operating conditions. Not more than 20 mg peak to peak (adjacent peaks) in the 1 - 10 Hz range.
2. Acceleration and Deceleration: Smooth constant and not less than 3 feet/second² with an initial ramp between 0.5 and 0.75 second.
3. Sustained Jerk: Not less than 6 feet/second³.
4. Measurement Standards: Measure and evaluate ride quality consistent with ISO 18738, using low pass cutoff frequency of 10 Hz and A95 peak-to-peak average calculations.

H. Noise and Vibration Control

1. Airborne Noise: Measured noise level of elevator equipment and its operation shall not exceed 60 dBA inside car under any condition including door operation and car ventilation exhaust blower on its highest speed. Limit noise level in the machine room relating to elevator equipment and its operation to no more than 80 dBA. All dBA readings to be taken 3'-0" off the floor and 3'-0" from the equipment using the "A" weighted scale.
2. Vibration Control: All elevator equipment provided under this contract, including power unit, controller, oil supply lines, and their support shall be mechanically isolated from the building structure and electrically isolated from the building power supply and to each other to minimize the possibility of objectionable noise and vibrations being transmitted to occupied areas of the building.

2.4 OPERATION

A. Duplex Selective Collective Microprocessor-Based, Car(s) 1-2 and 3-4:

1. Operate cars without attendants from pushbuttons in cars and located at each floor. When cars are available, park one car at main floor ("home" car). Park other car where last used ("free" car).
2. Respond to car calls and hall calls above main floor using the "free" car. Once a car has started, respond to registered calls in the direction of travel and in the order the floors are reached.
3. Do not reverse car direction until all car calls have been answered, or until all hall calls ahead of the car and corresponding to the direction of car travel have been answered.
4. Slow cars and stop automatically at floors corresponding to registered calls in the order in which they are approached in either direction of travel. As slowdown is initiated for a hall call, automatically cancel hall call. Cancel car calls in the same manner. Hold car at arrival floor an adjustable time interval to allow passenger transfer.
5. Answer calls corresponding to direction in which car is traveling unless call in the opposite direction is the highest (or lowest) call registered.
6. When the free car is clearing calls, start home car to respond to:
 - a. A call registered on home car pushbuttons.
 - b. An up hall call registered below free car.
 - c. An up or a down call registered above free car while free car is traveling down.
 - d. A hall call when free car is delayed in its normal operation for a predetermined period.
7. When both cars are clearing calls, stop only one car in response to any registered hall call. Return the first car to clear its calls to main floor. Should last service required bring both cars to main floor, the first arriving car becomes the free car.
8. Illuminate appropriate pushbutton to indicate call registration. Extinguish light when call is answered.

B. Other Items:

1. Load Weighing: Provide means for weighing car passenger load. Control system to provide dispatching at main floor in advance of normal intervals when car fills to capacity. Provide hall call by-pass when the car is filled to preset percentage of rated capacity

- and traveling in down direction. Field adjustment range: 10% to 100%.
2. Independent Service: Provide controls for operation of each car from its pushbuttons only. Close doors by constant pressure on desired destination floor button or door close button. Open doors automatically upon arrival at selected floor.
- C. Firefighters' Service: Provide equipment and operation in accordance with code requirements.
- D. Automatic Car Stopping Zone: Stop car within 1/4" above or below the landing sill. Maintain stopping zone regardless of load in car, direction of travel, distance between landings, hoist rope slippage, or stretch.
- E. Motion Control: Microprocessor based AC, variable-voltage, variable frequency with digitally encoded closed-loop velocity feedback suitable for operation specified and capable of providing smooth, comfortable car acceleration, retardation, and dynamic braking. Limit the difference in car speed between full load and no load to not more than $\pm 3\%$ of the contract speed.
- F. Priority Service: CODE BLUE - Provide feature as specified for Car(s) 3-4.
1. Feature shall be activated via CARD READER, mounted in hoistway entrance PUSH BUTTON PANEL at floors ALL. Activation of card reader switch at any floor shall cause the following operation of selected elevator(s). An adjacent small blue light jewel to illuminate at that floor and all other floors with a priority service keyed switch to indicate car(s) "CODE BLUE." Illuminate corresponding small blue light jewel in lobby control panel. Registered car call(s) for selected car shall be cancelled. A blue light with the engraved signage beneath "please exit car" at the top of the car operating panel shall pulsate indicating to riding passengers the car has been commandeered for priority service. Include audible annunciation verbiage as selected. A car traveling toward floor of activation shall express non-stop to that floor. A car traveling away from floor of activation shall stop at the next available floor, reverse without opening doors, and express non-stop to floor of activation.
 2. Upon arrival of car at floor of activation, car shall open its door(s) and "park" for an adjustable time period of 60 - 90 seconds.

- Provide second card reader device adjacent to blue light in car operating panel for attendant operation of car under priority service feature. Upon activation, car "park time" shall be voided and car shall be under control of attendant. Registration of a destination floor, followed by the activation of the door close button, shall cause express non-stop travel to selected floor. Upon arrival at selected floor, car shall open its doors and remain at that floor until another floor is selected or elevator is placed on Independent s service via key activated switch in car panel or service cabinet. Failure to activate car independent keyswitch within preset time constraints of 60 - 90 seconds shall cause car to be automatically restored to normal service.
- G. Door Operation: Automatically open doors when car arrives at main floor. At expiration of normal dwell time, close doors.
- H. Emergency Lighting and Alarm: Car mounted battery unit with solid-state charger to operate alarm bell and car emergency lighting. Battery to be rechargeable with minimum 5-year life expectancy. Include required transformer. Provide constant pressure test button in service compartment of car operating panel. Provide lighting integral with portion of normal car lighting system.
- I. Emergency Power Operation: Upon loss of normal power, adequate Emergency power will be supplied via building electrical feeders to simultaneously start and run one car in each group at contract car speed and capacity.
1. Automatically return one car at a time, in each group, nonstop to designated floor, open doors for approximately 3.0 seconds, close doors, and park car. During return operation, car and hall call pushbuttons shall be rendered inoperative. As each car parks, system shall immediately select the next car until all cars in a group have returned to the designated floor. If a car fails to start or return within 30 seconds, system shall automatically select the next car in the group to automatically return.
 2. When all cars in a group have returned to the designated floor, one car in each group shall be designated for automatic operation. When a service demand exists for 30 seconds and designated car fails to start, next available car in the group shall be automatically selected for operation.

3. Provide separate group selection switch(es) in lobby control panel. Properly label light and switch per code.
 - a. Switch(es) shall be labeled "EMERGENCY POWER OVERRIDE" with positions marked "AUTO" and appropriate car numbers controlled by each respective switch. Key shall be keyed differently than key utilized for firefighters' Phase I and II key switch. Key shall be removable in "AUTO" position only.
 - b. Switch shall override automatic return and automatic selection functions, and cause the manually selected car to operate. Manual selection shall cause car to start and proceed to designated floor and open and close its doors before Emergency power is manually transferred to next selected car.
 - c. Provide "EMERGENCY POWER" indicator lights (one per car) in lobby control panel. Indicator light illuminates when corresponding car is selected, automatically or manually, to operate on Emergency power.
4. Successive Starting: When normal power is restored or there has been a power interruption, individual cars in each bank shall restart at five-second intervals.
- J. Card/Proximity Reader Security System: Provide provisions, WIRING ONLY FROM MACHINE ROOM TO MAIN CAR OPERATING PANEL, Car(s) ALL

2.5 MACHINE ROOM EQUIPMENT

- A. Arrange equipment in spaces shown on drawings.
- B. Guarding of equipment shall be per OSHA and ASME Code.
 1. Both the cable drive/sheave area and the electric motor end of the drives need to be protected. (ASME A17.1 indicates that moving parts associated with elevator equipment must be guarded per OSHA) (29 CFR 1910.212(a)(1)).
- C. Geared Traction Hoist Machine:
 1. Single worm geared or helical geared traction type with AC induction or P.M.S.M. ACV3F motor, brake, gear, drive shaft, deflector sheave, and gear case mounted in proper alignment on an isolated bedplate. Provide bedplate blocking to elevate secondary or deflector sheave above machine room floor.
 2. Provide hoist machine mounted direct drive, digital, closed-loop velocity encoder.
 3. Provide hoist machine drip pans to collect lubricant seepage.

4. Provide machine bedplate mounted deflector sheave A-frame or supporting steel beams and fastenings to mount deflector sheaves to building structure. Provide minimum 16 gauge easily removable sound insulated sheet metal closures in hoistway wall opening around machine.
 5. Provide ladders and platforms with handrails and toeboards for overhead sheave access within the bounds of the machine room.
- D. Solid State Power Conversion and Regulation Unit: Provide solid-state, alternating current, variable voltage, variable frequency (ACV3F), I.G.B.T converter/inverter drives.
1. Design unit to limit current, suppress noise, and prevent transient voltage feedback into building power supply. Provide internal heat sink cooling fans for the power drive portion of the converter panels. Conform to IEEE standards 519-1992 for line harmonics and switching noise.
 2. Isolate unit to minimize noise and vibration transmission. Provide isolation transformers, filter networks, and choke inductors.
 3. Suppress solid-state converter noises, radio frequency interference, and eliminate regenerative transients induced into the mainline feeders or the building Emergency power generator.
 4. Supplemental direct-current power for the operation of hoist machine brake, door operator, dispatch processor, signal fixtures, etc., from separate static power supply.
 5. ACV3F Drives for gearless elevators shall be regenerative and utilize IGBT converter/inverter and dynamic braking during overhauling condition.
- E. Encoder: Direct drive, solid-state, digital type. Update car position at each floor and automatically restore after power loss.
- F. Controller: UL/CSA labeled.
1. Compartment: Securely mount all assemblies, power supplies, chassis switches, relays, etc., on a substantial, self-supporting steel frame. Completely enclose equipment with covers. Provide means to prevent overheating.
 2. Relay Design: Magnet operated with contacts of design and material to insure maximum conductivity, long life, and reliable operation without overheating or excessive wear. Provide wiping action and means to prevent sticking due to fusion. Contacts carrying high

inductive currents shall be provided with arc deflectors or suppressors.

3. Microprocessor-Related Hardware:

- a. Provide built-in noise suppression devices which provide a high level of noise immunity on all solid-state hardware and devices.
- b. Provide power supplies with noise suppression devices.
- c. Isolate inputs from external devices (such as pushbuttons) with opto-isolation modules.
- d. Design control circuits with one leg of power supply grounded.
- e. Safety circuits shall not be affected by accidental grounding of any part of the system.
- f. System shall automatically restart when power is restored.
- g. System memory shall be retained in the event of power failure or disturbance.
- h. Equipment shall be provided with Electro Magnetic Interference (EMI) shielding within FCC guidelines.

4. Wiring: CSA labeled copper for factory wiring. Neatly route all wiring interconnections and securely attach wiring connections to studs or terminals.

5. Permanently mark components (relays, fuses, PC boards, etc.) with symbols shown on wiring diagrams.

6. Monitoring System Interface: Provide controller with serial data link through RJ45 Ethernet connection and install all devices necessary to monitor items outlined in Part 2. Elevator contractor responsible to connect monitoring system interface to machine room monitoring compartment and LAN. Wiring from the LAN to the machine room monitoring compartment by others. Controllers shall be Lift Net compatible.

7. Provide controller or machine mounted auxiliary, lockable "open," disconnect if mainline disconnect is not in sight of controller and/or machine.

G. Sleeves and Guards: Provide 2" steel angle guards around cable or duct slots through floor slabs or grating. Provide rope and smoke guards for sheaves, cables, and cable slots in machine room and secondary machinery levels.

H. Machine and Equipment Support Beams:

1. Provide structural steel beams required for direct support of and attachment to building structure of hoist machine, deflector sheaves, overhead sheaves, governor, and hoist rope dead-end hitch assemblies.
 2. Provide bearing plates, anchors, shelf angles, blocking, embedment, etc., for support and fastening of machine beams or equipment to the building structure.
 3. Isolate machine and overhead sheave beams to prevent noise and vibration transmission to building structure.
 4. Provide hold-down bolts for offset hoist machines located beside or under hoistway where concrete hold-down pad is provided.
 5. Provide ladders and platforms with handrails and toe boards for overhead sheave access within the confines of the machine room.
- I. Governor: Centrifugal-type, car driven machine room mounted with pull-through jaws and bi-directional shutdown switches. Provide required bracketing and supports for attachment to building structure.
- J. Emergency Brake: Provide means to prevent ascending car over-speed and unintended car movement per code.

2.6 HOISTWAY EQUIPMENT

- A. Guide Rails: Planed steel T-sections for car and counterweight of suitable size and weight for the application, including brackets for attachment to building structure. Provide rail backing and intermediate counterweight tie brackets to meet code requirements. No additional structural points of rail attachment, other than those shown on the Contract Documents, will be provided.
- B. Buffers, Car and Counterweight: Oil type with blocking and support channels.
- C. Sheaves: Machined grooves and sealed bearings. Provide mounting means to machine beams, machine bedplate, car and counterweight structural members, or building structure.
- D. Counterweight: Steel frame with metal filler weights. Provide Type "B" safety device.
- E. Counterweight Guide Shoes: Spring dampened roller guide shoes.
- F. Counterweight Guard: Metal guard in pit. Where counterweight is provided between adjacent elevators, provide runway guard next to the adjacent elevator.

G. Governor Rope and Encoder Tape Tensioning Sheaves: Mount sheaves and support frame on pit floor or guide rail. Provide frame with guides or pivot point to enable free vertical movement and proper tension of rope and tape.

H. Hoist and Governor Ropes:

1. 8 x 25 Seale construction, traction steel type. Fasten with staggered length, adjustable, spring isolated wedge type shackles.
2. Governor rope to suit Contractor's specification.

I. Terminal Stopping: Provide normal and final devices. CARS 1-2 Provide emergency terminal speed limiting devices.

J. Electrical Wiring and Wiring Connections:

1. Conductors and Connections: Copper throughout with individual wires coded and connections on identified studs or terminal blocks. Use no splices or similar connections in wiring except at terminal blocks, control compartments, or junction boxes. Provide 10% spare conductors throughout. Run spare wires from car connection points to individual elevator controllers in the machine room. Provide four pair of spare shielded communication wires in addition to those required to connect specified items. Tag spares in machine room.
2. Conduit: Painted or galvanized steel conduit, EMT, or duct. Conduit size, 3/4" minimum. Flexible heavy-duty service cord may be used between fixed car wiring and car door switches for door protective devices.
3. Traveling Cables: Flame and moisture-resistant outer cover. Prevent traveling cable from rubbing or chafing against hoistway or equipment within hoistway. Provide from each car controller to car top, plus 3'-0" excess loop at both ends and additional wiring:
 - a. (1) 6 conductor 22 awg stranded shielded cable for card reader.
 - b. (1) Cat. 6 shielded twisted 4 pair cable for elevator phone.
 - c. (1) Cat. 6 shielded twisted 4 pair cable for future IP CCTV camera.
 - d. (1) Cat. 6 shielded twisted 4 pair cable for future IP wireless access device.
 - e. (1) RG 6 coax cable 23 awg solid conductor, Duofoil 95% braid shield coverage for CCTV analog.

- f. (1) 2 solid conductors, 16 awg with, overall foil shield 100% coverage 22 awg stranded drain wire for fire alarm smoke detector.
 - g. Provide two (2) pair 14 gauge wire for CCTV power.
- 4. Auxiliary Wiring: Connect fire alarm initiating devices, emergency two-way communication system, CCTV, card reader, intercom, and/or background music in each car controller in machine room.
- K. Entrance Equipment:
 - 1. Door Hangers: Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust roller adjustment.
 - 2. Door Tracks: Bar or formed, cold-drawn removable steel tracks with smooth roller contact surface.
 - 3. Door Interlocks: Operable without retiring cam. Paint interlock box flat black.
 - 4. Door Closers: Spring, spirator, or jamb/strut mounted counterweight type. Design and adjust to insure smooth, quiet mechanical close of doors.
 - 5. Hoistway Door Unlocking Device: Provide unlocking device with escutcheon in door panel at all floors, with finish to match adjacent surface.
 - 6. Hoistway Access Switches: Mount in wall b at top and bottom floor(s). Provide switch with faceplate.
- L. Floor Numbers: Stencil paint 4" high floor designations in contrasting color on inside face of hoistway doors or hoistway fascia in location visible from within car.

2.7 HOISTWAY ENTRANCES

- A. Complete entrances bearing fire labels from a nationally recognized testing laboratory approved within the governing jurisdiction.
- B. Frames: 14 gauge hollow metal at all floors. Bolted and lapped head to jamb assembly at ALL floors. Provide Arabic floor designation/Braille plates, centered at 60" above finished floor, on both side jambs of all entrances. Provide plates at main egress landing with "Star" designation. For designated emergency car, provide "Star of Life" designation plates at height of 78" - 84" above finished floor on both side jambs at all floors. Braille indications shall be below Arabic floor designation. Provide cast floor designation/Braille plates as manufactured by SCS, Vision Mark, or Entrada.

- C. Door Panels: 16 gauge steel, sandwich construction without binder angles. Provide leading edges of center-opening doors with rubber astragals. Provide a minimum of two (2) gibs per panel, one at leading and one at trailing edge with gibs in the sill groove entire length of door travel. Construct door panels with interlocking, stiffening ribs.
- D. Sight Guards: 14 gauge, same material and finish as hoistway entrance door panels. Construct without sharp edges.
- E. Sills: Nickel silver.
- F. Sill Supports: Structural or formed steel designed to support door sill based upon car loading classification. Mount to eliminate need for grout under the sill. CARS 3-4 Provide 5" x 5" x 1/2" cold-rolled structural steel angle, extending full width of hoistway. Fasten to building structure at maximum 18" O.C.
- G. Fascia, Toe Guards and Hanger Covers: 14 gauge furniture steel with Contractor's standard finish. Provide full height fascia, toe guards, and hangar covers where rear entrances are not provided.
- H. Struts and Headers: Provide for vertical support of entrances and related material. Provide door open bumpers on entrances equipped with vertical struts.
- I. Finish of Frames and Doors:

Car(s)	Floor	Frames	Door Panels
1-2	ALL	STAINLESS STEEL	STAINLESS STEEL
3-4	ALL	STAINLESS STEEL	STAINLESS STEEL

2.8 CAR EQUIPMENT

- A. Frame: Welded or bolted, rolled or formed steel channel construction to meet load classification specified.
- B. Safety Device: Type "B," flexible guide clamp.
- C. Platform: Isolated type, constructed of steel, or steel and wood which is fireproofed on underside. Design and construct to accommodate load classification requirements. Provide Class "A" construction for passenger elevators, Class A construction for service elevator.
- D. Platform Apron: Minimum 14 gauge steel, reinforced and braced to car platform front and rear with black enamel.

- E. Guide Shoes: Roller type with three or more spring dampened, sound-deadening rollers per shoe. Maximum roller rotation speed, 350 r.p.m. up through contract car speed of 900 fpm.
- F. Finish Floor Covering:
1. Car(s) 1-2: Refer to Section 09 06 00 Schedule For Finishes
 2. Car(s) 3-4: Refer to Section 09 06 00 Schedule For Finishes
- G. Sills: One piece extrusion with extruded extension between car entrance columns to face of car front return. Extruded extension to match finish of sill.
1. Car(s) 1-2: nickel silver
 2. Car(s) 3-4: nickel silver
- H. Doors: Provide as specified for hoistway entrance doors.
- I. Door Hangers: Two-point hanger roller with neoprene roller surface and suspension with eccentric upthrust roller adjustment.
- J. Door Track: Bar or formed, cold-drawn removable steel track with smooth roller contact surface.
- K. Door Header: Construct of minimum 12 gauge steel, shape to provide stiffening flanges.
- L. Door Electrical Contact: Prohibit car operation unless car door is closed.
- M. Door Clutch: Heavy-duty clutch, linkage arms, drive blocks and pickup rollers or cams to provide positive, smooth, quiet door operation. Design clutch so car doors can be closed, while hoistway doors remain open.
- N. Restricted Opening Device: Provide car-door interlock per code to prevent opening of car door(s) outside unlocking zone.
- O. Door Operator: High speed, heavy-duty door operator capable of opening doors at no less than 2-1/2 f.p.s. Accomplish reversal in no more than 2-1/2" of door movement. Provide solid-state door control with closed loop circuitry to constantly monitor and automatically adjust door operation based upon velocity, position, and motor current. Provide a minimum of four (4) controller-activated motion profiles, per floor, per door, to maintain consistent, smooth, and quiet door operation at all floors, regardless of door weight or varying air pressure.
- P. Door Control Device:
1. Infrared Reopening Device: Black fully enclosed device with full screen infrared matrix or multiple beams extending vertically along

leading edge of each door panel to minimum height of 7'-0" above finished floor. Device shall prevent doors from closing and reverse doors at normal opening speed if beams are obstructed while doors are closing, except during nudging operation. In event of device failure, provide for automatic shutdown of car at floor level with doors open.

2. Nudging Operation: After beams of door control device are obstructed for a predetermined time interval (minimum 20.0 - 25.0 seconds), warning signal shall sound and doors shall attempt to close with a maximum of 2.5 foot pounds kinetic energy. Activation of the door open button shall override nudging operation and reopen doors.
3. Interrupted Beam Time: When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds. When beams are interrupted after the initial 3.0 second hold open time, reduce time doors remain open to an adjustable time of approximately 1.0 - 1.5 seconds after beams are reestablished.
4. Differential Door Time: Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
 - a. Car Call: Hold open time adjustable between 3.0 and 5.0 seconds.
 - b. Hall Call: Hold open time adjustable between 5.0 and 8.0 seconds. Use hall call time when car responds to coincidental calls.

Q. Car Operating Panel:

1. CARS 1-2-3-4 One car operating panel(s) with faceplate(s), consisting of a metal box containing vandal resistant operating fixtures, mounted behind the car stationary front return panel(s)
2. Suitably identify floor buttons, alarm button, door open button, door close button, and emergency "HELP" button with SCS, Visionmark, or Entrada cast tactile symbols rear mounted. Configure plates per local building code accessibility standards including Braille. Locate operating controls no higher than 48" above the car floor; no lower than 35" for emergency "HELP" button and alarm button.
3. Provide minimum 3/4" diameter raised floor pushbuttons which illuminate to indicate call registration.

4. Provide alarm button to ring bell located on car top. Illuminate button when actuated.
5. Provide keyed stop switch at bottom of car operating panel in locked car service compartment. Mark device to indicate "run" and "stop" positions.
6. Provide "door open" button to stop and reopen doors or hold doors in open position.
7. Extended Door Hold Open Button: CARS 3-4 Provide button to extend normal door hold open period up to 30 seconds. Cancel extended time by registration of car call or actuation of door close button.
8. Provide "door close" button to activate door close cycle. Cycle shall not begin until normal door dwell time for a car or hall call has expired, except firefighters' operation.
9. Provide firefighters' Phase II key switch with engraved instructions filled red. Include light jewel, audible signal, and call cancel button.
10. Provide lockable service compartment with recessed flush door. Door material and finish shall match car return panel or car operating panel faceplate.
11. Include the following controls in lockable service cabinet with function and operating positions identified by permanent signage or engraved legend:
 - a. Inspection switch.
 - b. Light switch.
 - c. Three-position exhaust blower switch.
 - d. Independent service switch.
 - e. Constant pressure test button for battery pack emergency lighting.
 - f. 120-volt, AC, GFCI protected electrical convenience outlet.
 - g. Card reader override switch.
 - h. Switch to select either floor voice annunciation, floor passing tone, or chime.
12. Provide black paint filled (except as noted), engraved, or approved etched signage as follows with approved size and font:
 - a. Phase II firefighters' operating instructions on main operating panel above corresponding key-switch filled red.
 - b. Car number on main car operating panel.

- c. "Certificate of Inspection on File in Building Office" on main car operating panel.
- d. "No Smoking" on main car operating panel.
- e. Car capacity in pounds on main car operating panel.
- R. Car Top Control Station: Mount to provide safe access and utilization while standing in an upright position on car top.
- S. Work Light and Duplex Plug Receptacle: GFCI protected outlet at top and bottom of car. Include on/off switch and lamp guard. Provide additional GFCI protected outlet on car top for installation of car CCTV.
- T. Communication System:
 - 1. "HELP"," two-way communication instrument in car with automatic dialing, tracking and recall features, with shielded wiring to car controller in machine room. Provide dialer with automatic rollover capability with minimum two numbers.
 - a. "HELP" button or adjacent light jewel shall illuminate and flash when call is acknowledged. Button shall match car operating panel pushbutton design. Provide uppercase "HELP," "HELP ON THE WAY" engraved signage adjacent to button.
 - b. Provide "HELP" button tactile symbol, engraved signage, and Braille adjacent to button mounted integral with car front return panel.
 - 2. Provide two-way communication between car and machine room if required.

2.9 CAR ENCLOSURE

- A. Car Enclosure Passenger Elevator 1-2: Provide complete as specified herein and detailed on architectural drawings. Provide the following features.
 - 1. Shell: Reinforced 14 gauge furniture steel formed panels with baked enamel interior finish as selected. Apply sound-deadening mastic to exterior.
 - 2. Canopy: Reinforced 12 gauge furniture steel formed panels with lockable, hinged emergency exit. Interior finish white reflective baked enamel.
 - 3. Front Return Panels and Integral Entrance Columns: Reinforced 14 gauge stainless steel satin finish. Swing entire unit on substantial pivot points (minimum 3) for service access to car

- operating panel(s). Locate pivot points to provide full swing of front return panel without interference with side wall finish or handrail. Secure in closed position with concealed three-point latch. Provide service compartment with recessed flush cover and cutouts for operating switches, etc.
4. Front Return Panels: Reinforced 14 gauge stainless steel satin finish with cutouts for car operating panel(s) and other equipment.
 5. Entrance Columns: Reinforced 14 gauge satin finish stainless steel.
 6. Transom: Reinforced 14 gauge satin finish stainless steel full width of enclosure.
 7. Car Door Panels: Reinforced minimum 16 gauge satin finish stainless steel. Same construction as hoistway door panels.
 8. Base: Stainless steel with concealed ventilation cutouts.
 9. Ventilation: Morrison Products, Inc. two-speed, SOE No. 06-01055, exhaust blower mounted to car canopy on isolated rubber grommets. Exhaust blower shall meet requirements of Item 2.03, H.
 10. Lighting: Provide fluorescent fixtures with wiring and hookup. Coordinate with emergency lighting requirements. Provide emergency lighting integral with portion of normal car lighting system.
 11. Suspended Ceiling: Refer to Section 09 06 00 Schedule For Finishes.
 12. Handrails: Minimum 1-1/4" diameter Special design. Refer to Section 09 06 00 Schedule For Finishes.
 13. Interior Wall Finishes: Refer to Section 09 06 00 Schedule For Finishes
- B. Car Enclosure Service Elevator 3-4: Provide complete as specified herein. Provide the following features.
1. Shell: Reinforced 14 gauge stainless steel formed panels as specified in Item 2.02. Apply sound deadening mastic to exterior.
 2. Canopy: Reinforced 12 gauge furniture steel formed panels with lockable hinged emergency exit. Interior finish white reflective baked enamel.
 3. Front and Rear Return Panels: Reinforced 14 gauge stainless steel, textured finish as specified in Part 2, Article "Materials".
 4. Entrance Columns and Transom: Reinforced 14 gauge stainless steel, No. 4 satin finish.
 5. Car Door Panels: Reinforced minimum 16 gauge stainless steel textured finish as specified in Item 2.02. Same construction as

- hoistway door panels. Architectural metal cladding shall wrap around leading and trailing edge of panel and return a minimum of 1/2" on rear side of leading edge of panels.
6. Ventilation: Morrison Products, Inc. two-speed exhaust blower model OE mounted to car canopy on isolating rubber grommets. Provide with a diffuser and grille. Exhaust blower shall meet requirements Part 2, Article "Car Performance".
 7. Lighting: Fluorescent fixture flush mounted in ceiling with protective diffuser and steel guard over fixtures on car top.
 8. Handrails/Guardrails: Two lines. Top handrail line minimum 1-1/4" diameter stainless steel tubular grab bar. Lower guardrail line 4" x 3/8" solid stainless steel flatstock bars mounted on both sides of the car. Locate bottom guardrail line at 8" above car floor and handrail line at 32" above the car floor. Bolt rails through car walls from back and mount on 1-1/2" deep solid round stainless steel standoff spacers no more than 18" O.C. Return handrail/guardrail ends to car walls.

2.10 HALL CONTROL STATIONS

- A. Pushbuttons: Provide ONE riser with flush mounted faceplates. Include pushbuttons for each direction of travel which illuminate to indicate call registration. Include approved engraved message and pictorial representation prohibiting use of elevator during fire or other emergency situation as part of faceplate. Pushbutton design shall match car operating panel pushbuttons. Provide vandal resistant pushbutton and light assemblies.

2.11 SIGNALS

- A. Hall Lantern, All Cars: Provide at each entrance to indicate travel direction of arriving car. Locate as detailed on architectural drawings. Illuminate up or down LED lights and sound tone once for up and twice for down direction prior to car arrival at floor. Sound level shall be adjustable from 20 - 80 dBA measured at 5'-0" in front of hall control station and 3'-0" off floor. Illuminate light until the car doors start to close. Provide advanced hall lantern notification to comply with ADA hall call notification time. Car direction lenses shall be with inscribed direction shaped arrows with faceplates. Lenses shall be minimum 2-1/2" in their smallest dimension.

B. Car Position Indicator: CARS 1-2 Alpha-numeric digital indicator containing floor designations and direction arrows a minimum of 1/2" high to indicate floor served and direction of car travel. Locate fixture in each car operating panel. When a car leaves or passes a floor, illuminate indication representing position of car in hoistway. Illuminate proper direction arrow to indicate direction of travel.

C. Car Position Indicator: CARS 3-4

1. CE Electronics, Elite P1 Microcomm, 10 inch, active matrix color TFT type display in the main car stations. Display elevator position, direction of travel, and up to eight (8) priority messages. The system shall also be capable of displaying floor-based messages as well as scheduled messages in either text or graphic formats. The display shall also be capable of time, date, and temperature. The upper part of the screen shall be reserved for car position and direction which shall be at all times. All messages shall be displayed on the lower part of the screen with space for four (4) lines of approximately 18 characters per line; only one message shall be displayed at a time.
2. The displays shall have a priority override sequence available. A duration shall be assigned for each of the floor-based messages so that they are displayed one after another for the time intervals specified. When the car has committed to stop at a floor a directory message shall be displayed overriding any floor -based message. While the car doors are open the directory message shall continue to be displayed and the triangle indicating the car's direction shall move up and down. When the car doors close the directory message shall disappear. Elevator display information shall be kept updated via a serial link. System updates shall use windows-based software to be provided to Owner and shall be able to be programmed via a standard RS485 link. The display shall have the following abilities:
 - a. User customized display layout
 - b. User choice of background colors
 - c. Choice of font style
 - d. Choice of different arrow styles
 - e. Choice of factory and customer designed graphic files
 - f. Remote display updates by choice of one or more displays

3. In addition to position and direction, the display shall interface with the elevator control system to provide system-based messages for the following conditions at a minimum:
 - a. Firefighters' Service, Phase I
 - b. Firefighters' Service, Phase II
 - c. Independent Service
 - d. Elevator Recall Activated
- D. Hall Position Indicator, ALL Car(s): Alpha-numeric digital indicator containing floor designations and direction arrows a minimum of 1/2" high to indicate floor served and direction of car travel. Mount integral with hall lanterns at G (Ground) floor.
- E. Faceplate Material and Finish: Stainless steel Satin finish all fixtures.
- F. Floor Passing Tone: Provide an audible tone of no less than 20 decibels and frequency of no higher than 1500 Hz, to sound as the car passes or stops at a floor served.
- G. Voice Synthesizer: Provide electronic device with easily reprogrammable message and female voice to announce car direction, floor, emergency exiting instructions, etc.

2.12 GROUP CONTROL AND DISPLAY PANEL

- A. Firefighters' Key Box: Flush-mounted box with lockable hinged cover. Engrave instructions for use on cover per Local Fire Authority requirements.
- B. Machine Room Display Unit: Provide groups of elevators with a machine room color SVGA monitor. As a minimum, SVGA monitor shall display the following functions:
 1. Car operating in normal/Emergency power.
 2. Car position and direction of travel.
 3. Car calls.
 4. Hall calls.
 5. Operating mode.
 6. Door status.
 7. Delayed car.
 8. Load weighing and by-pass.
 9. Car in/out of service.
 10. Card reader override. Individual car on/off provisions.

C. Provide additional visual display and monitoring provisions specified in Items 2.12, C above.

1. Provide wiring from ROB elevator machine rooms to the UD Building 1 Maintenance Supervisor's Room BW104A for remote monitoring of elevator performance/status. Provide necessary equipment/software to view the ROB elevator performance/status on the existing elevator monitoring computer terminal located in UD Building 1 Room BW104A. No adjustments to elevators can be made from the remote monitoring system

PART 3 EXECUTION

3.1 SITE CONDITION INSPECTION

- A. Prior to beginning installation of equipment examine hoistway and machine room areas. Verify no irregularities exist which affect execution of work specified.
- B. Do not proceed with installation until work in place conforms to project requirements.

3.2 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in Contractor's original unopened protective packaging.
- B. Store material in original protective packaging. Prevent soiling, physical damage, or moisture damage.
- C. Protect equipment and exposed finishes from damage and stains during transportation, erection, and construction.

3.3 INSTALLATION

- A. Install all equipment in accordance with Contractor's instructions, referenced codes, specification, and approved submittals.
- B. Install machine room equipment with clearances in accordance with referenced codes and specification.
- C. Install all equipment so it may be easily removed for maintenance and repair.
- D. Install all equipment for ease of maintenance.
- E. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
- F. Remove oil, grease, scale, and other foreign matter from the following equipment and apply one coat of field-applied machinery enamel.
 1. All exposed equipment and metal work installed as part of this work which does not have architectural finish.

2. Machine room equipment, hoistway equipment including guide rails, guide rail brackets, and pit equipment.
3. Neatly touch up damaged factory-painted surfaces with original paint color. Protect machine-finish surfaces against corrosion.

3.4 FIELD QUALITY CONTROL

- A. Work at jobsite will be checked during course of installation. Full cooperation with reviewing personnel is mandatory. Accomplish corrective work required prior to performing further installation.
- B. Have Code Authority acceptance inspection performed and complete corrective work.

3.5 ADJUSTMENTS

- A. Install rails plumb and align vertically with tolerance of 1/16" in 100'-0". Secure joints without gaps and file any irregularities to a smooth surface.
- B. Static balance car to equalize pressure of guide shoes on guide rails.
- C. Lubricate all equipment in accordance with Contractor's instructions.
- D. Adjust motors, power conversion units, brakes, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks, and safety devices to achieve required performance levels.

3.6 CLEANUP

- A. Keep work areas orderly and free from debris during progress of project. Remove packaging materials on a daily basis.
- B. Remove all loose materials and filings resulting from work.
- C. Clean machine room equipment and floor.
- D. Clean hoistways, car, car enclosure, entrances, operating and signal fixtures.

3.7 ACCEPTANCE REVIEW AND TESTS

- A. Review procedure shall apply for individual elevators, portions of groups of elevators and completed groups of elevators accepted on an interim basis or elevators and groups of elevators completed, accepted, and placed into operation.
- B. Contractor shall perform review and evaluation of all aspects of its work prior to requesting Consultant's final review. Work shall be considered ready for Resident Engineer and Consultant's final contract compliance review when all Contractor's tests are complete and all elements of work or a designated portion thereof are in place and

elevator or groups of elevators are deemed ready for service as intended.

- C. Furnish labor, materials, and equipment necessary for Resident Engineer and Consultant's review. Notify Consultant a minimum of five (5) working days in advance when ready for final review of elevator or group.
- D. Consultant's written list of observed deficiencies of materials, equipment and operating systems will be submitted to Contractor for corrective action. Consultant's review shall include as a minimum:
 - 1. Workmanship and equipment compliance with Contract Documents.
 - 2. Contract speed, capacity, floor-to-floor, and door performance comply with Contract Documents.
 - 3. Performance of following is satisfactory:
 - a. Starting, accelerating, running
 - b. Decelerating and stopping accuracy
 - c. Door operation and closing force
 - d. Equipment noise levels
 - e. Signal fixture utility
 - f. Overall ride quality
 - g. Performance of door control devices
 - h. Operations of emergency two-way communication device
 - i. Operations of firefighters' service
 - j. Operations of special security features and floor lock-off provisions
 - k. Operations of emergency brake device
 - 4. Test Results:
 - a. In all test conditions obtain specified contract speed, performance times, stopping accuracy without re-leveling, and ride quality to satisfaction of Purchaser and Consultant. Tests shall be conducted under both no load and full load condition.
 - b. Temperature rise in motor windings limited to 50° Celsius above ambient. A full-capacity one (1) hour running test, stopping at each floor for ten (10) seconds in up and down directions, may be required.
- E. Performance Guarantee: Should Consultant's or Resident Engineer's review identify defects, poor workmanship, variance, or noncompliance with requirements of specified codes and/or ordinances, or variance or

noncompliance with the requirements of Contract Documents, Contractor shall complete corrective work in an expedient manner to satisfaction of Purchaser and Consultant at no cost as follows:

1. Replace equipment that does not meet code or Contract Document requirements.
2. Perform work and furnish labor, materials, and equipment necessary to meet specified operation and performance.
3. Perform retesting required by Governing Code Authority, Purchaser, and Consultant.

F. A follow-up final contract compliance review shall be performed by Consultant after notification by Contractor that all deficiencies have been corrected. Provide Consultant with copies of the initial deficiency report marked to indicate items which Resident Engineer and Contractor considers complete. If additional reviews are required due to Contractor's gross non-compliance with initial and follow-up deficiency reports, consultant shall bill Contractor at normal billing rates plus expenses, and Contractor acknowledges it will pay for additional compliance reviews.

3.8 GOVERNMENT'S INFORMATION

A. Non-Proprietary Equipment Design: Provide three sets of neatly bound written information necessary for proper maintenance and adjustment for equipment of within 30 days following final acceptance. Final retention will be withheld until data is received by The Government and reviewed by Consultant. Include the following as minimums:

1. Straight-line wiring diagrams of "as-installed" elevator circuits with index of location and function of components. Provide one set reproducible master. Mount one set wiring diagrams on panels, racked, or similarly protected in elevator machine room. Provide remaining set rolled and in a protective drawing tube. Maintain all drawing sets with addition of all subsequent changes. These diagrams are the Government's property. A legend sheet shall be furnished with each set of drawings to provide the following information:
 - a. Name and symbol of each relay, switch, or other apparatus.
 - b. Location on drawings, drawing sheet number and area, and location of all contacts.
 - c. Location of apparatus, whether on controller or on car.

2. Printed instructions explaining all operating features.
3. Complete software documentation for all installed equipment.
4. Machine room and hoistway drawings "as-installed".
5. Complete "as-installed" fixture drawings.
6. Complete "as-installed" cabs and interior drawings.
7. Lubrication instructions including recommended grade of lubricants.
8. Parts catalogs listing all replaceable parts including Contractor's identifying numbers and ordering instructions.
9. Four sets of keys for all switches and control features properly tagged and marked.
10. Diagnostic test devices together with all supporting information necessary for interpretation of test data and troubleshooting of elevator system and performance of routine safety tests.
11. The elevator installation shall be a design that can be maintained by any licensed elevator maintenance company employing journeymen mechanics, without the need to purchase or lease additional diagnostic devices, special tools, or instructions from the original equipment Contractor.
 - a. Provide on site capability to diagnose faults to the level of individual circuit boards and individual discrete components for the solid state elevator controller.
 - b. Provide a separate detachable device as required to the Government as part of this installation if the equipment for fault diagnosis is not completely self-contained within the controller. Such device shall be in possession of and become property of the Purchaser.
 - c. Installed equipment not meeting this requirement shall be removed and replaced with conforming equipment at no cost to the Government.
12. Provide upgrades and/or revisions of software during the progress of the work, warranty period, and the term of the ongoing maintenance agreement between the Government and Contractor.

- - -END OF SECTION- - -